



Academia de Studii Economice
Departamentul de Informatică și Cibernetică Economică

Calea Dorobanți, 15-17, Sector 1, București, 010552 (camera 2314)

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Contest Topics for Professor
Position 30, year 2024-2025, semester 2

**Disciplines: Programming Techniques and Algorithms (in English);
Evolutionary Programming and Genetic Algorithms; Evolutionary
Programming and Genetic Algorithms (in English)**

Programming Techniques and Algorithms

1. External data organization as files
2. Text files. Sequential binary files.
3. Relative binary files.
4. Indexed binary files.
5. Algorithm complexity. Divide et Impera method.
6. Sorting algorithms: quick sort, heap sort, Shell sort, counting sort, radix sort, bucket sort.
Randomizing quick sort.
7. Greedy method.
8. Searching in solution space. Backtracking method.
9. Graphs. Definitions, representations and traversing.
10. Connectivity. Paths.
11. Applications of graph traversing: edge classification, detecting cut nodes, topological sorting.
12. Weighted graphs. Shortest (lowest cost) paths. Yen algorithm, Dijkstra algorithm.
13. Tree graphs. Minimum spanning trees: Kruskal and Prim algorithms.

Bibliography:

1. I.Gh. Roșca, B. Ghilic-Micu, C. Cocianu, M. Stoica, C. Uscatu, M. Mircea, *Programarea calculatoarelor. Algoritmi în programare*, ASE, Bucuresti, 2007, România
2. C. Uscatu, M. Popa, L. Pocatilu (Bătăgan), C. Silvestru, *Programarea calculatoarelor. Aplicații*, ASE, Bucuresti, 2012, România
3. Thomas H. Cormen, Charles E. Leiserson, Ronald R. Rivest, *Introducere în algoritmi*, Computer Libris Agora, 2000, România
4. D. Knuth, *Arta programării calculatoarelor(vol. 1-3)*, Teora, 2001, România
5. C. Uscatu, C. Cocianu, B. Ghilic-Micu, M. Stoica, M. Mircea, *Algoritmi și tehnici de programare*, ASE, 2015, România



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6. C. Uscatu, C. Cocianu, M. Mircea, L. Pocatilu, *Algoritmi și tehnici de programare. Aplicații*, ASE, 2015, România

Evolutionary Programming and Genetic Algorithms

1. Evolutionary algorithms. Components and classification – introduction.
2. From direct search to stochastic search: Hill-climbing algorithm.
3. Genetic algorithms. Representations, phenotype coding. Variation operators: mutation. Classes of mutation algorithms.
4. Genetic algorithms. Variation operators: crossover. Classes of crossover algorithms.
5. Genetic algorithms. Population models. Selection probabilities. Parent selection mechanisms. Survivors selection.
6. Evolution strategies. Auto-adaptation, ES2M and general algorithms.

Bibliography

1. Cocianu Cătălina, Uscatu Cristian, *Programare evolutivă și algoritmi genetici, ed. a 2-a*, ASE, 2022, Bucuresti, România
2. Eiben, A. E., Smith, J. E., *Introduction to Evolutionary Computing*, Springer-Verlag, 2015
3. Fulcher, J., Jain, L. C. (Eds.), *Computational Intelligence: A Compendium*, Springer-Verlag, 2008
4. Engelbrecht, A.P., *Computational Intelligence. An Introduction*, John Wiley & Sons, 2007